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ABSTRACT

This report describes the Distance Learning Project North, which began in September 1988 in Alberta, Canada. The primary emphasis of the project was on increasing equity in educational opportunity and the focus was testing alternative distance education delivery systems which can be used to provide equitable, cost-effective education to the project schools. The project was to explore a multi-grade model where a "classroom" was composed of students from many grades in learner-centered mathematics supported by a computer managed learning (CML) system. Students in these classes would study modular, independent learning materials while receiving instructional support, question and answer support, evaluation and assessment from off-site. A case study evaluation consisting of interviews, observations, and document analysis was used to ensure recognition of contextual factors that affected the project. Results indicate that overall attitudes toward the CML mathematics experience were positive. Organization and structure of materials may be improved, and both students and teachers would benefit from orientation to the distance learning program prior to its commencement. Copies of the interview protocols used with principals, teachers, and students are included. (DB)

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Evaluation of Year One
of
Distance Learning Project North

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Under contract to Alberta Education, Edmonton, Alberta.

February 15, 1990

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W. Bruce Clark Margaret Haughey

February 15, 1990

Please Note:

The views and recommendations expressed in this report are those of the evaluators and not necessarily those of the Department of Education.

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1. INTRODUCTION

Background

Distance Learning Project North began in September 1988 and was one of two developmental projects in Alberta with a primary emphasis on increasing equity in educational opportunity. The other project was the Distance Learning in Small Schools Project which was concentrated geographically in the southeastern quadrant of the province. In contrast, Project North was located in the northwestern quadrant in a quadrilateral, the points of which are Meander River to the north, Slave Lake to the east, Silver Valley to the west, and Fox Creek to the south. Documentation provided by the Project Office[1] describes the focus of Project North as being to test alternative distance education delivery systems which can be used to provide equitable, cost-effective education to the project schools. The first thrust of the project was to explore a *multi-grade* model where a "classroom" was composed of students from a number of grades in a common subject area. The same document indicates that the plan also proposed that a *multi-subject* approach be undertaken in which students from a number of subject areas and grade levels be assembled in a distance learning classroom. Students in these classes would study modular, independent learning materials while receiving instructional support, question and answer support, evaluation and assessment from off-site. A third component was to have been a live, interactive French program delivered via satellite to selected schools.

The project was coordinated by the Alberta Correspondence School and a steering committee composed of senior administrators of the districts involved, together with representatives from other parts of Alberta Education; Digital Equipment Corporation (DEC); Computer Based Training Systems (CBTS); Technology, Research and Telecommunications (TRT); Alberta Government Telephones (AGT); North Peace Adult Consortium; and Fairview College. A contract was let to Fairview College to provide a coordinator who was responsible for hardware and software installation, inservice, and general trouble-shooting. The implementation took place in stages. The first stage implemented in Fall, 1988, was the multi-grade class and the subject area selected was mathematics. The Alberta Correspondence

Table 1.1

Schools participating in Year One of Project North.

County of Grande Prairie #1	Sexsmith Secondary Beaverlodge
East Smoky S.D. #54	Ridgevalley Fox Creek
Fairview RCSSD #35	St. Thomas More (Fairview)
Fairview SD #50	Hines Creek Worsley
Falher Consolidated S.D. #69	Ecole Routhier
Fort Vermilion S.D. #52	High Level La Crete Rainbow Lake Fort Vermilion Public Rocky Lane Upper Hay River (Meander River)
Grande Prairie RCSSD #28	St. Joseph's (Grande Prairie)
Grande Prairie S.D. #2357	Grande Prairie Composite
High Prairie S.D. #48	Kinuso E. W. Pratt (High Prairie) Roland Michener (Slave Lake)
North Peace RCSSD #43	Glen Mary (Peace River) Holy Family (Grimshaw)
Peace River #10	Paul Rowe (Manning) Grimshaw Jr-Sr High School
Spirit River S.D. #47	Eaglesham Savanna Spirit River

School revised its mathematics courses to provide new independent study materials for students in all courses in mathematics. Digital Equipment Corporation's MicroVAX 2000 series computers were acquired for participating sites, and a computer managed learning system developed and distributed by Computer Based Training Systems was installed on the MicroVAX 2000s to handle the functions of student tracking and testing.

In most schools which implemented CML mathematics, a stand-alone MicroVAX system was installed. In one case (Sexsmith Secondary), however, a MicroVAX system was installed that could be used remotely, and Grand Prairie Composite and St. Joseph's in Grande Prairie installed terminals, printers, and modems only, and used these to access the system in Sexsmith. In the fall of 1989, Grande Prairie Composite discontinued taking its CML feed from Sexsmith and installed its own system. St. Joseph's is continuing to take its feed from Sexsmith, and Beaverlodge is planning to access Sexsmith's system beginning after Christmas, 1989. Similarly, in 1988-89, Holy Family, Grimshaw took its feed from Glenmary but since then has purchased its own VAX system. (Since Summer, 1989, Digital has discontinued making the MicroVAX 2000 series and now offers the 3000 series.)

In the second stage of the project, implemented in January 1989, additional equipment supportive of distance delivery was acquired. FAX machines were acquired for all schools. Most acquired teleconferencing convenors, and some acquired audiographic systems. *Teleconferencing convenors* permit voice-only communication among students at participating sites which is commonly referred to as *audioconferencing*. *Audiographic systems* include the transmission of computer graphics as well as voice. The project provided inservice training in the operation of the new technology, but no formal plans seem to have been prepared for its implementation for instructional purposes. Several schools did try out audioconferencing in both instructional and non-instructional contexts. A number of obstacles arose which prevented completion of the satellite French component of the project, and this was dropped. A plan to produce a series of mathematics vignettes which could be broadcast to the schools was also delayed.

Participating Schools

The number of schools involved in Project North grew during the year. Originally it was thought that there would be 13 participating schools. By June, 1989 the number had increased to 26. Table 1.1 lists the participating jurisdictions and the schools involved.

Table 1.2

Year one schools and the forms of technology implemented for instruction.

School	CML		Audioconferencing	
	88-89	89-90	88-89	89-90
Beaverlodge		1	√	
La Crete		5		
E. W. Pratt (High Prairie)	2			
Eaglesham		√	√	
Ecole Routhier	√	√	5	5
Fort Vermilion Public	√	√	√	√
Fox Creek	2			
Glenmary (Peace River) [4]	√	√	√	
Grande Prairie Comp	√	√	3	
Grimshaw Jr-Sr High Sch [4]		√	√	
High Level	√	√	√	√
Hines Creek		√	√	
Holy Family (Grimshaw) [4]	√	√		
Kinuso	√	√	√	
Paul Rowe (Manning) [4]	√	√		
Rainbow Lake	√	√	√	√
Ridgevalley	√	√	√	
Rocky Lane	√	√	√	√
Roland Michener (Slave L.)			√	
Savanna	√	√	√	
Sexsmith Secondary	√	√	√	
St. Joseph's (Grande Prairie)	√	√		
St. Thomas More (Fairview)	√	√	3	3
Upper Hay River	√	√	√	√
Worsley	√	√	√	

1. Plans under way to take CML feed from Sexsmith in winter term.
2. Using CML materials and printouts of CML tests supplied from another school.
3. Supplier but not consumer of teleconferencing courses.
4. Audiographic systems installed for future use.
5. Equipment present but not used for instructional purposes.

If one examines this list one finds that it includes schools of varying enrollments. Generally the schools have fewer than 100 high school students, though there are notable exceptions such as St. Joseph's in Grande Prairie and Sexsmith Secondary, and, of course, Grande Prairie Composite with approximately 1400 students. In the case of Grande Prairie Composite, the interest in CML mathematics lay not as an instructional approach for the entire school but rather for a very small subset of its students. One also should note two schools which were part of the Project but in which no distance education took place during the 1988-89 school year, La Crete and Spirit River. Table 1.2 lists the schools visited by the evaluators and indicates which technologies were used in these schools in each school year. Each school was contacted by telephone during November, 1989, to ascertain what changes had been implemented after the first year of the project. In some cases technology which was tried during the 1988-89 school year was not continued into 1989-90, and, conversely, some schools implemented new technology during 1989-90. Where teleconferencing is indicated in Table 1.2, the reader may assume that FAX machines were employed to transmit student assignments to an off-site teacher, either in another school or at the Alberta Correspondence School. (The use of the FAX machine in Project North posed no problems for the schools and, therefore, little attention will be paid the use of that technology in this report. This contrasts with the evaluation of the DLSS Project[2] where the high volume of pages being transmitted by FAX did pose some problems.)

Role of the Evaluators

The role of the evaluators in Phase 1 of Project North needs some explanation. Because of the circumstances which surround the beginning of any large scale project, there was concern that the presence of external evaluators during the time when products and processes were just being put in place would add an unnecessary complication. On the other hand, there was the perception that independent evaluators might contribute information that would be useful to the project. Also, there was a desire to capture baseline data which might be used in a subsequent evaluation of the project. Consequently the role of the evaluators during Phase 1 was to be largely one of familiarizing themselves with the project, gathering baseline data, and testing evaluation methodology. They were also expected to feed back to the project leadership and the Planning & Policy Secretariat information which might be useful in guiding the project.

The statement of work for the evaluation listed four tasks :

1. To conduct an introductory tour of the sites participating in Distance Learning Project North.

2. To assist in the collection of baseline data for 1988-89 and to develop interview protocols.

3. To visit each of the project sites, and meet with each of the stakeholders: project management, superintendents, principals, those responsible for coordinating the project, participating teachers, students, representatives from the cooperating agencies, and those responsible for developing the materials that were used.

4. To produce a Phase 1 evaluation report which would include proposed revisions to the evaluation questions, and a straight-line projection of how the performance in Phase 1 might be perceived within the context of a Phase 2 evaluation.

Because of the need to balance the provision of useful evaluative information with sensitivity to the circumstances surrounding the start-up phase of an ambitious project, the report which follows will integrate the information gathered across the entire project. Perceived strengths and weaknesses of individual sites will not be identified by location. The reader should keep in mind, however, that the evaluators found substantial commonality among the experiences of the participating schools, and the findings reported here ought not to be attributed to a small number of exceptions.

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[2] For additional information on the DLSS Project see, Clark, W.B. and Schieman, E., (1989) **Evaluation of Phase 1 of the Distance Learning in Small Schools Action Research Project**, Alberta Education; and also, Clark, W.B. and Schieman, E. (1990) **Evaluation of Phase 2 of the Distance Learning in Small Schools Action Research Project**, Alberta Education.

2. EVALUATION METHODOLOGY

General Approach

In order to obtain an accurate understanding of the implementation of the project, a research design which stressed the project's exploratory and developmental nature was undertaken. A case study approach was used to ensure the recognition of contextual factors which affected the project. This evolutionary design allowed for the inclusion of items which the participants considered important but which might not have been considered in the original design of the evaluation.

Data Gathering Techniques

The specific methodologies employed were interviews with personnel involved in various aspects of the project, observation of project implementation in the schools, and document analysis. The sites were divided between the two investigators, and over the course of the year two site visits were made to each participating school. During the first visit the principal and participating teachers were interviewed, and some in-class observations took place. For the second site visit, each investigator was accompanied by two research assistants who interviewed students while the investigator conducted follow-up interviews with teacher(s) and the principal. Confirmatory site observations were also conducted. All but two superintendents of the participating jurisdictions involved in the project were interviewed on at least one occasion, as were some central office staff. The investigators also attended one steering committee meeting as observers and spent time in intensive interviews with the project leaders, other Alberta Correspondence School staff, and representatives of Digital Equipment Corporation, Computer Based Training Systems, and ACCESS. Since the site visits to the schools all took place during the 1988-89 school year, telephone interviews with the principals were conducted during November, 1989, chiefly to ascertain differences between the

implementation of distance education in the schools in 1989-90 compared to the previous year. In all, 37 person-days were devoted to field work and data gathering.

Interviews. The interview formats varied from a series of pre-selected questions for the student interviews (all instrumentation in Appendix A) to semi-structured interviews with school staffs and project leaders. Because of the large numbers of students who were involved in some schools, it was not possible to interview each student. In these cases a subset of students selected by the principal were interviewed individually, while the remaining students were interviewed in focus groups of seven to 10 students. Principals were requested to identify for individual interviews those students who represented a cross-section of the population. As a data gathering strategy, focus groups were of limited use. While they yielded useful information when suggestions for change and/or improvement were elicited, they proved less than satisfactory for gathering data on individual, personal experiences. Student data were gathered on response sheets which the interviewers filled out during the interview.

In order to ensure consistency across the project, the investigators shared their experiences in using the student interview guides and response sheets after data had been gathered at three schools. Based on these discussions, they amended the interview schedules to reflect new issues which had been identified by students. For example, in developing the student interview protocol the evaluators had not anticipated that students would discover a variety of techniques for "short-circuiting" the way the CML system was intended to be used. When they met, the evaluators compared responses from individual and group interviews for richness of data and decided to continue with individual interviews wherever possible. The meetings of the evaluators and research assistants provided an opportunity to enhance inter-rater reliability of the interview data through cross-checking the categorization of responses to individual questions.

The semi-structured interviews with principals and teachers were based on common sets of questions drawn up by the investigators but were amended during the course of the conversations to follow up on topics of interest to the interviewee. The sequence of site visits allowed for the development of questions based on data collected as the study progressed. These further questions became the focus of discussion during the second site visits. The third set of interviews, which were conducted by telephone, were based on a pre-arranged set of questions that had been sent previously by FAX.

Observations. Time was taken at each site to visit the classroom used for CML mathematics and to note the physical arrangements, the strategies for student groupings, the placement of the computers, and the charts, notices, binders and booklets connected with the mathematics program.

Document analysis. Materials prepared for the various advisory groups and committees were reviewed to ensure accuracy of contextual information. Booklets and computer-generated tests were examined for confirmation of items arising from the interviews.

Data Analysis

Student data were gathered on response sheets which the interviewers filled out during the interviews. These data were subsequently collated by school and then reviewed to obtain patterns of student responses. In order to ensure consistency across the project, the investigators maintained contact throughout the period while interviews were being conducted, shared their experiences, and amended the interview schedules to reflect the issues which arose. This also provided an opportunity to enhance the reliability of the interviewers. Interview data were examined after each round of visits to identify categories of responses, general themes, and issues or problems which concerned the participants. The team members met on each of these occasions to share their individual interview notes and reflections and to seek for consistency and clarity in the data analysis. At this time, other topics or questions were identified for possible examination. Following the second round of visits, a rough categorization of responses was attempted, and this was returned to participating principals. This had two functions: (1) It provided a means of assessing the accuracy and completeness of the categorized data, and (2) because it displayed the variety of responses rather than discussing the most common items, it was a potential learning device for those principals who wanted to know of similar concerns in other contexts and how colleagues had solved them.

Credibility of Data. Data credibility and dependability were maintained through cross-checks with knowledgeable participants and through the use of a variety of information sources, e.g., observation notes, student questionnaire data, distance education instructional materials, to produce triangulation of the information. Further, preliminary transcripts of the analysis were circulated to principals for their verification.

Summary

An exploratory and iterative case study design was used to obtain data through observations, interviews, and document analysis. Data from the interviews were categorized and collated with document and observational information to identify achievements and concerns which arose during the implementation and to describe the processes used to solve these concerns. Triangulation procedures and verification of categories and themes through checks with school -based participants and other knowledgeable personnel ensured the credibility and transferability of the data.

3. DESCRIPTION OF FINDINGS

The specific applications which formed the focus of this study were the implementation of learner-centred high school mathematics correspondence school materials supported by a computer managed learning system, and the introduction of a variety of other technologies to enhance distance learning opportunities generally. These technologies included audio-conferencing, audiographics, and FAX machines. Originally, the plans for implementation included the provision of a grade 10 French course which would pilot the use of interactive satellite broadcasts with audioconferencing as well as prepared print materials. A continuing problem for all the courses was the limited amount of time for course development. This was compounded in the French course by the fact that the provincial curriculum was being changed and the new Program of Studies had not been completed. Hence, the French 10 pilot was not available for implementation.

Lack of sufficient development time was also a factor in the completeness of the CML test bank. Although the test bank contained questions for most of the domains addressed in the program, the number of questions was very limited in the early stages and there were many inconsistencies in the format required for the student responses. Throughout the project, both the CML test bank and some of the mathematics materials were revised to overcome those pedagogical concerns which were identified by Alberta Correspondence School staff and participating teachers.

While FAX machines and the MicroVAX computers and terminals were in place in the participating schools in September, 1988, the audioconferencing equipment did not arrive until February, 1989. Hence, while almost all schools participated in the CML mathematics implementation and used FAX machines to speed the turnaround time for students taking correspondence school courses, only a few schools piloted the Social Studies 13 course, or used audioconferencing. The audiographics capability was not used mainly due to technical problems in set up at the sites involved. (There are plans to use the audiographics system to support the teaching of Mathematics 31 between St. Thomas More High School in Fairview and Glenmary High School in Peace River in the second term of 1989-90.)

CML Mathematics

The CML mathematics implementation raised a number of issues for teachers, students, and principals at the school level. These have been categorized under the following headings. Because of the iterative nature of the project, many of the concerns raised by individuals in June, 1989 have been already addressed in this school year (1990-91).

The Booklets. Teachers who had reviewed the booklets commented favorably on their comprehensiveness in covering all topics. They recognized that all students would be required to cover all topics thereby putting them on a par with students throughout the province. Some commented that many assumptions about students' capabilities had not been spelled out in the print materials as clearly as they wished, and that such assumptions sometimes did not reflect the reality of their students' mathematical competencies.

An examination of the booklets showed some general weaknesses, however, in their instructional design. Teachers and students identified these weaknesses when they requested more examples, greater synthesis of content across modules, and more attention to student understanding of mathematical processes. Teachers also expressed concerns about student motivation which were linked to the ways students used the booklets. Many booklets followed a standard format in which the general *content* was presented, followed by a series of examples to be worked on by the student. This format did not match the classroom pedagogy used in teaching mathematics to which the students were accustomed. In the familiar format, teachers worked through *examples* from the particular to the general, thus providing a framework for the development and confirmation of principles and procedures. Only then were students given application items. This departure from the familiar had two impacts: (1) the students tended to skip the introduction of content and begin with the examples, and (2) teachers tried to provide oral overviews to units and booklets to help students focus on the important aspects. Taken to its extreme, some teachers used the materials as a resource only and taught their classes directly, reserving the examples and tests for individual seat work.

As the booklets have been revised by ACS, a number of changes have been made: the pedagogy has been re-examined and the general design and visual format have been improved. However, there are still fewer examples to choose from than some teachers desire. The issue of the quality of the pedagogical design of the materials remains a crucial factor, especially where teachers are not mathematics specialists and may depend on the booklets to carry the content.

Across the project, teachers used a variety of approaches to managing CML mathematics. In some schools, students were required to complete the booklet before being allowed to access the test, while in others they did not use the booklet except as a resource after they had completed an initial test. In units where the relationship between test bank items and

the booklet content was strained, some teachers gave up requiring students to work in the booklets since the mismatch between the practice and test items led more to confusion than learning. In contrast, other teachers were adamant that working through the booklets gave the student a much more thorough grounding in the principles of mathematics. The teacher's choice of approach may also have been influenced by some of the following factors.

Computerized testing. The paucity of items in the test bank gave rise to a number of problems which will be easily alleviated as the bank is expanded. In some areas, the items in the bank were too difficult for the grade level or did not correspond to the level of difficulty of the examples in the booklet. There were few items at the Mathematics 30 level which used wording similar to that of the Diploma examination. Some domains were tested inadequately and problem-solving items were noticeably few.

These weaknesses, in turn, gave rise to compensatory activities by teachers, most frequently through the provision of additional questions. Students, recognizing the likelihood that consecutive tests would contain similar and sometimes the same questions, and that test scores were the major indicator of achievement, chose to use the tests as organizers for their learning. Where allowed, they drew a test, worked on the incorrect responses (sometimes using the booklets as a resource) and then drew a second test. Because computer testing was seen as analogous to the elimination of teacher marking, teachers were unprepared for the number and variety of questions which they had to mark themselves. These varied from booklet practice questions where the student could not find the error to test bank items where process was the focus. Perhaps it was the variety of questions which teachers had to handle within a class period which contributed to the teacher's frustrations with marking, since it meant that they had to be able to work in any area of the curriculum and at any grade level at a moment's notice. Where teachers were not mathematics specialists, this was an especially difficult task. Because students needed the feedback in order to know whether they could proceed to the next unit, some students refused to move ahead until their work was marked and incidentally gave themselves some spare time. In such circumstances, however, teachers tended to over-ride the computer's control so that students could continue. Some teachers commented that the provision of a pre-test would allow students to set up a challenge for themselves and enhance their motivation to work through the booklets.

Another suggestion was to increase the use of the messaging function to provide a motivational bonus for students. Students also proposed the addition of Mathematics 30 examples, the inclusion of Diploma practice tests, the use of a review test if a student failed a supervised test, and the inclusion of processes as well as answers in feedback on tests. The programming capability to address most of these issues was already present but perhaps

teachers were not aware of the suggestions or decided not to implement them in this first trial year.

The Mathematics 30 diploma exams are a somewhat sensitive subject among schools. Most schools reported that students who wrote Mathematics 30 Diploma examinations in June, 1989 did not do as well as expected. Most schools also indicated that there may be alternate explanations for the lower marks than the fact that the students took CML mathematics. On the other hand, the fact that this experience was common across so many of the schools suggests that the preparation for the Diploma examinations is a matter warranting close attention.

Computer Equipment. After the initial start-up in most schools, there appeared to be few problems with the hardware or software. Where there were difficulties, the Distance Learning Implementation Coordinator (Rik Hall) provided a fast, effective service. Some schools had three terminals hooked to their MicroVAX computer, and when all were in operation, the speed of operations slowed down substantially. This, in turn, created problems of access for students in the classroom. In general, having only two terminals on the MicroVAX was necessary if 15-18 students were to have ready access to the test bank. Digital Equipment Corporation indicates that new software which was loaded on the 2000 series computers now runs more quickly than what was available in 1989. Also, the 3000 series which are now available, are supposed to be much faster machines.

Computer management. Because of the limited time available for the construction of the test bank items, previously developed test banks were used in addition to newly constructed items. Unfortunately, there was a lack of consistency in the format in which students were required to enter their answers. For example, sometimes the answer was required to the fourth decimal; other items required that the answer be rounded off. Where students used an alternative way of stating the answer, (not reducing fractions was one of the most common), this answer was not accepted as correct. Hence, in the fall term, there was much frustration and teacher time expended on identifying inaccurate responses, correcting the "errors" on individual student examinations and reclaiming student grades. The amount of time teachers put into these activities, and their concern that their students not be penalized, cannot be overestimated. Teachers spent time, both in class and as much as one hour after school every day, changing grades and learning to operate the programs and to access student history data. A few teachers worked their way through all of the tests at each grade level and provided a binder which students could consult to see the format required.

Many of these problems have now been eliminated, and most teachers feel reasonably "competent" with the system; however, the diagnostic functions of the computer program are

generally under-utilized and teachers are only beginning to understand how they can be integrated into their program. Few teachers use the program to identify areas of student weakness so that they can provide small group remediation. This is one area where teachers can use the computer to do the initial selection rather than depending on their own memory of student errors. A manual which would outline these possibilities and show the programming necessary to access these functions is now in preparation.

Scheduling. With respect to scheduling, schools varied along three dimensions. (1) They varied in the extent to which they formally scheduled mathematics periods, ranging from schools with no designated periods, to those with some assigned periods, to those with all assigned classes. (2) They also varied in the composition of these classes where they ranged from classes of mathematics students from all grades to those with specific combinations of grades, to those designated by grade level, e.g., 10's. (3) Class size was the third variable with groups ranging from a high of 34 to those with 5 students.

These three factors combined to form variations not all of which were equally successful. Students and school staff generally preferred at least some scheduled times. They also found it best to limit classes, thereby reducing the range of possible tutor topics for the teacher. Some did this by confining the class to one grade level while others combined no more than three different learning combinations (e.g., 31, 23, 10). The larger the class size at one grade level, the more likely it was that the teacher had to group the students rather than work with them individually to provide assistance. The number of students doing each variation of mathematics at that grade level was also a factor. There was some indication in Phase 1, incidentally, that a maximum of approximately 20 students (some would say 16) seems to be an appropriate number until the procedures for assisting students become more streamlined and the speed of computer test generation quickened. After their experiences in 1988-89, most schools are much more aware of the potential problems raised by each combination and have taken steps to ensure a reasonable class in size and grade diversity.

While the fluidity in enrolment of grades 11 and 12 continues to be an uncontrollable factor for small rural high schools, principals now are able to offer students the opportunity to obtain credits regardless of timetable or employment conflicts. Many principals spoke of individual arrangements which had been highly beneficial to the students and which the school could not have accommodated in any other way.

Learning management. The specific learning management structures which teachers implemented reflected most strongly the philosophical orientation of the introductory inservice. These teachers had heard that they would be facilitators of learning who provided individual

tutoring to students learning at their own rates. (Some believed that the CML system was actually a computer *assisted* learning or CAL system.) They began the year by spending time discussing student responsibilities including the sequence of the course content, the number of modules, the use of the computer as a testing tool and the importance of working consistently to finish the course in the time provided. Many developed a time line based on completion dates for the units at that grade level and made posters identifying these dates so that students could easily calculate the difference between where they were and where they were supposed to be. Because the provision for individual student progression which was emphasized as a core value of the program was one most teachers espoused, they did not intervene and enforce deadlines by which students had to have completed each unit. The notion of "going at one's own rate" was taken to apply to classroom time. In fact, many students did no homework and did not use their spares to meet the unit dates necessary for course completion. While some teachers focused on keeping students on task and introduced the topics of the booklets in mini-lessons, others were besieged by forests of hands and spent their entire periods answering questions and marking or remarking tests and examinations.

Of importance was whether teachers demanded that booklets be completed prior to drawing a test. Some teachers just advised students to do the booklet while others gave a grade for the completed booklet; some allowed students to pull a test but wanted to see the completed work in the booklet before assisting students with their mistakes. Other teachers started by requesting completion of booklets and then found themselves and their students frustrated by the lack of congruity between the booklets and the tests for some units and consequently gave up the procedure. Where teachers were working with 20 or more students, supervision of booklet completion was onerous and time consuming. In many instances, students were unwilling to proceed unless the teacher had marked the booklet or the test exercises. This led to unstructured time for the student and a potential source of disruptive behavior in the classroom.

Unwilling to disrupt the option of "own rate" progression, some teachers used grading schemes to structure students' work. These schemes included allocating marks for completing the booklets or counting the mark received on the first of the practice exercises toward the course grade but still requiring 80% in three tries for competency. Other teachers assigned a percentage of the final mark to each test. All these procedures were designed to discourage students from drawing tests before attempting the booklets. Where students were required to complete the booklets, there were fewer complaints about the lack of test/booklet correlation. In some instances, teachers pulled review tests prior to the teacher-supervised test to help students review several booklets at once.

Teacher assistance. Where teachers had classes of 26 or more students, or where all students who had spares had the option of attending the mathematics room, teachers had difficulty meeting all the students' requests for assistance. One school had provided and others planned to provide, a student with good peer tutoring skills who had completed Mathematics 30 and could earn work experience credits by providing student assistance. In another school where the MicroVAX was heavily utilized, an adult was employed to enter student test responses into the CML system and thereby reduce the lag time while students waited for access to the computer. While it solved the "wait" problem, it also denied the student access to the computer and the immediacy of response which was a positive motivational feature for some students. In one school, the adult aide, at the request of the teacher, used the computer to obtain diagnostic information from the test results. From this information, the teacher then identified the small group of learners who needed further work. Tasks for assistants varied from non-instructional activities such as entering tests and pulling diagnostic information and student histories to situations where the focus was on individual student assistance and where the aide identified for the teacher those students with a common concern.

Classroom environment. Not all teachers seemed equally aware of the potential impact of the classroom's physical environment. The suggestions given to teachers at the preliminary workshop provided some options, but most often the location of computer plugs and telephone jacks were significant factors in room organization. Some teachers clustered desks or tables in an oval or horseshoe format with the teacher's desk at the open end while others had tables or desk clusters placed throughout the room. Some formats made teacher supervision more difficult. Having a space set aside for the teacher supervised tests was also important in helping the teacher control the situation in the classroom. This is another area where evident changes have been made this year, following the experiences in 1988-89. Where the social organization of the class is not controlled by direct focus on the teacher's voice and actions, then the physical structure of the classroom is important in conveying the message of a common focus on task completion.

Cooperative learning. In many schools, students developed informal learning groups whose members provided support and assistance to each other. Many teachers commented positively on the increase in peer tutoring and in task-focused conversation. They noted that where students formed supportive work groups, they were more likely to keep to the schedule and because they all worked on the same booklets, it was easier for the teacher to provide a mini-lesson to introduce the concept and ensure that it was clearly understood. A small number

of teachers indicated that the conversation in such groups tended to be more social than academic.

Tutoring-Teaching. From the initial inservice, teachers clearly expected that their time would be taken up in tutoring individual students rather than in didactic teaching. One teacher commented after this introduction, "This is management, where is the teaching?" Despite a desire to go over the concepts and explain them in order to ensure that students fully understood the topics, teachers in general avoided full class lectures.

The transfer of students from a system where the teacher provided the impetus through a class lecture, and sustained the focus through seat work, to one where students had to obtain all the information from written booklets and provide their own motivation with limited teacher assistance was a difficult transition for many students. Some teachers felt that introductory sessions were essential to ensure students had the necessary background and motivation but found these difficult to continue as students spread out through the units.

There were difficulties at the beginning of the school year in both 1988-89 and in 1989-90. In September, 1988, this was due to the late arrival of the print materials which came in mid October. There was a similar delay in Fall, 1989 because, following revisions, there was insufficient time to produce enough booklets and the numbers of schools requesting materials escalated. Fortunately, the delay was not as long as in the previous year.

Most teachers confined themselves to working with individual students. In organizing for this school year,however, most planned to do more direct teaching. Some thought that they would introduce new concepts to the entire class as the bulk of the students began a new unit, with slower students taking notes which the teacher would go over later, and with faster students using it as a review. Some planned to keep students in cohorts so that they could monitor them more closely. Some talked about dropping the three-part competency provision and replacing it with a once-only test. While these options would seem to address a number of issues—keeping students moving forward at a reasonable pace and ensuring that all students had a full understanding of the concepts—they would limit the full benefit of the program: individual student progress. The drive to include direct teaching, either to small groups or to a total class, did not result so much from teachers' desire to teach as from a concern that the print materials did not introduce the topics appropriately. There was a concern that weaker students in particular, were learning to focus on mathematical procedures rather than principles, and that students did not see connections or were unable to address problems if they were stated in a format other than the one they had worked on in the booklet. Because the Mathematics 30 test bank in 1989-90 did not include questions in the same format as appeared in the Diploma examinations, many teachers did intensive coaching with students to ensure that they were

comfortable with the question structure and felt prepared for the examination. If teachers were convinced that students' needs were well served, they might then find ways to encourage students to maintain a steady pace other than by direct intervention in their learning.

Student Motivation. This was a topic of major interest for school staffs and students alike. All felt that students of whatever ability did well using this format *if they were self-motivated.* Their major concern was for the unmotivated students—especially those who didn't like either mathematics or reading. Without a support structure to guide their learning, many students were unable to cope with their newfound freedom. Some found the first two units relatively easy, and they relaxed, believing that catching up would not be difficult. Others gave up when they found that the format of the units was similar, and boredom set in. For others, the amount of reading required was their undoing. These students were used to an "oral/ visual" pedagogy and found the transfer to reading to be difficult since it involved another level of abstraction.

These poorly motivated students provided the biggest challenge and concern for teachers. They used up teacher time because they needed the longest explanations and yet were readily distracted if the teacher was working with another student. Some found ways to "beat the system" by pulling tests, comparing answers and seeking help from others. Only as a last resort, did they consult the booklets. Asked to explain what they did if they did not pass the competency test the first time, the majority of these students immediately drew a second test.. In comparison, however, some motivated students used the system to accelerate their progress and complete two or more mathematics courses in one year. These students generally enjoyed being able to pace themselves.

Reporting-Monitoring. Most teachers began by using the grade guide in the booklets and then amended it when they encountered problems. Teachers were somewhat frustrated because they felt responsible for the academic achievements of their students but, because students controlled the pace of their learning, saw themselves as unable to require activities which would ensure at least a minimum level of competency. "Working at one's own rate" meant that, in general, teachers monitored which units students were on, but only when little or nothing was accomplished over the course of a reporting period, did they approach the principal.

Teachers found the management function of the computer program very helpful in keeping track of students' progress. While some teachers pulled the information weekly, most collected histories about once per month. Some shared these with their students and encouraged them to show them to their parents, but teachers were aware that this did not

always happen. This was one feature which was used heavily at the beginning of the school year but was gradually ignored as the amount of marking increased exponentially.

Many teachers knew which units students were on but did not always keep track of how long they had been working on that unit. While some teachers sent home to parents regular histories reporting the unit the student was on and the marks for the competency tests to date, others also included 'expected progress' information so that parents knew what was expected.

The issues of course failure or continuation have been variously addressed. Where students were a unit or two short of course completion, some teachers planned to give a review test in September and then allow the student to continue from that competency level. Others encouraged selected students to work on their booklets over the summer. In fact, students who did not complete are continuing their courses either as a regular member of their scheduled class or in their spare periods. Happily, many students who did little work on the course last year have already completed that course and are working to catch up with their classmates. Students who had only one or two units completed, were counselled either to work at a lower level or repeat the entire course. This has not been a difficulty.

Audioconferencing

Audioconferencing was not heavily used during Phase 1, but a number of schools did employ it with a small number of students. Courses which were supported at least in part by audioconferencing were Accounting 10, Business Education 20, Biology 30, German, Mathematics 31, and Physics 20.

Whereas the introduction of the mathematics program occasioned teachers to reorganise the ways they structured their teaching, audioconferencing called for the development of teaching strategies which were not a regular part of their teaching repertoire. Accustomed to monitoring classes through non-verbal cues and using the chalkboard as a focus for didactic instruction, teachers had to depend on print materials to a much greater extent. Those who did not have prepared correspondence materials had to develop such materials. But, not only had teachers to obtain or develop materials, they also had to learn how to discipline their own on-air time and pace the instruction, to vary their instructional strategies to include a greater variety of voices and activities than is necessary in the classroom, and to monitor student learning and engender discussion using verbal cues alone.

Audioconferencing also requires appropriate hardware set up in convenient locations conducive to learning. Some schools had not given sufficient thought to the ramifications of

location and had put the telephone hook-up, the fax machine and the CML terminals beside each other. Another important consideration was the cost of long-distance telephone calls. Especially at the high school level where these schools are likely to be geographically far apart, inter-school cooperative teaching means regular long-distance costs.

Audioconferencing was most effective in providing tutoring for students who were doing Alberta Correspondence School courses. In these instances, the teacher called the students and dealt with any general questions first before providing individual assistance. These sessions were usually about 30 minutes long for 4 or 5 students and did not entail the need for a supervisory teacher at the receiving site. Individual students occasionally called the teacher for help at other times. This year, 1989-90, a number of the schools which tried audio-conferencing in Phase 1 are not using it. However, schools are beginning to use the equipment to enhance regular classroom instruction, such as "bringing in " guests to the class by telephone, and for informal student council meetings between schools. In one school district, Mechanics 12, Accounting 30, Physics 10 and French 10 are being offered by audioconferencing. These experiences will prove valuable in identifying those skills which teachers need to address if the system is to be successful for learners and teachers. It should be noted that some schools which employed audioconferencing last year are not doing so this year. The reasons associated with dropping it appear to be related to the management and pedagogical issues noted above. In the schools which have discontinued it, there was also a pattern in which (1) the teachers were doing the audioconferencing courses in addition to their regular class assignments with no extra remuneration and (2) were tutoring the subject, but the student assignments were being given and marked elsewhere.

Level of Satisfaction

The introduction of CML mathematics has been generally welcomed by principals and teachers because it provides for options which would not be possible in any other way. Not only does it expand the number of courses available, but more importantly, principals are now able to offer students courses more suited to their abilities. Formerly, in a school with seven or eight Mathematics 30 students and two more suited to Mathematics 33, the teacher had either to accommodate the materials to the range of ability levels and hope the students could manage to keep up or suggest that they work on correspondence materials. Most often such students did not take mathematics classes at all. Much of the student population in the northern Alberta is transient, and through the use of correspondence school materials, principals now have a means of helping students complete courses for credit rather than having them lose their

semester's work. Besides the organizational benefits, principals and teachers were also pleased at the growth in maturity as students took responsibility for their own learning and showed enthusiasm for their work. Asked if they would recommend the CML approach to others, students talked about the importance of motivation and being willing to work with little direct assistance. Thirty-six percent recommended it outright, and another 32 percent agreed, with the addition of the motivational caveat.

Audioconferencing has been used by too few teachers and students to have been fully explored. Where it has been used for tutoring, students, teachers and principals are pleased with the opportunity it affords to provide assistance to students. Its use as a technology to provide regular classroom instruction is in the process of being tested this year.

Summary

In general, the organization and structure necessary for successful implementation of CML mathematics has been identified and discussed in the categories identified above. Of continuing interest are the pedagogies which arise from using the correspondence materials within the regular classroom. In every case where the instruction is based on correspondence materials, the importance of the pedagogical design of the booklets and associated media cannot be over-emphasized.

4. RECOMMENDATIONS & COSTS

In many ways the findings reported in Chapter 3 are themselves the recommendations from this evaluation. There are, however, certain global areas upon which the evaluators wish to comment.

Materials Design

First, the evaluators commend the Alberta Correspondence School and all those who worked on developing and revising the materials for their responsiveness to feedback from the field. The mathematics course materials in the schools in 1989/90 were an extensively revised version of those in use in Year one of the project. Based on Year one data, a small number of students commented (a) that they found the printed materials followed a predictable pattern which over a number of lessons became monotonous and (b) that efforts at humour in some of the booklets occurred in places which, rather than adding levity, caused them frustration. A number of teachers commented that they found the materials strong for teaching procedures but weak for helping students identify and understand the underlying principles and recognize their potential application in new situations. Teachers also commented that the approach taken in presenting new content differed substantially from that to which students were accustomed. From such perceptions and a general review of the findings, the following recommendations are drawn:

1. The continued up-grading of the print materials to delineate learning objectives, cognitive linkages, required background knowledge and competencies, and evaluation options, as well as closer attention to a variety of learning strategies for differing ability levels is applauded and should be extended to all distance learning courses.

2. Developers of instructional materials should be sensitive to the fact that research has shown that instructional materials which follow a predictable pattern tend to be demotivating, and should vary the presentation form.

3. Humour should be used judiciously, be relevant to the subject matter, and be placed at points where students can be expected not to be experiencing frustration.

4. Curricular goals which emphasize principles or the learning process should be explicitly identified in the printed materials; and content addressing them should be labelled as such.

5. The materials should be examined to see if the introduction of new content indeed moves "from the known to the unknown", "from the concrete to the abstract." Since each content area requires particular pedagogical strategies, these, too, must be part of the course design.

6. Students should be oriented to the organization of the printed materials and taught how to use them effectively.

In addition, the evaluators would make seven other suggestions pertaining to the materials:

7. Instructional materials should be prepared which assist students to synthesize information across topics rather than depending upon tests to cause synthesis to occur.

8. The effort to increase the size and comprehensiveness of the test banks should continue. Further, given the pressures on non-specialist teachers to be able to answer inquiries about all aspects of the curriculum, there should be greater emphasis on the development of an expert system which would identify the sources of assistance available in the course materials and textbooks. Such a system might also extend the time the teacher has available to assist students since it would alleviate some of the more routine student questions.

9. The reality of the Departmental examinations should be recognized and provision made to prepare students for response formats which presently cannot be keyed into the CML system.

10. Non-print resources that can be used to augment the courses and reduce dependency on print-based material should be acquired.

11. Since the course materials must correspond to the Provincial Curriculum, it would seem advisable that there be a close working relationship between ACS and provincial curriculum development initiatives not just in the initial development of a course but also when changes are envisaged. This would enhance the likelihood that the distance learning materials would accurately reflect curriculum intentions and that particular requirements which impact on distance learners could be addressed.

12. The planning of appropriate teaching strategies by distance learning teachers would be enhanced if they received a design overview for each course. This should delineate for each unit or module,the specific intentions, content knowledge and instructional processes which flow from the Program of Studies and how these relate to each other. Such an overview would provide branching options to teachers and learners. It also provides a student or teacher with easy access to specific topics for review or further study.

13. Given the limited use of audioconferencing, with or without the audiographics system, further consideration needs to be given to assisting teachers to use these technologies for effective instruction. In particular, print materials which would guide the teacher in the preparation of materials, the use of instructional strategies, and appropriate administrative arrangements are needed. The necessary administrative arrangements and long distance costs may also be limiting factors in the effective use of this technology.

Teacher Inservice

The transition from the traditional classroom to the use of computer managed learning and distance education techniques is not necessarily an easy one for all teachers, and the methods necessary to assist students and manage classes in this new environment are not intuitively obvious. Consequently inservice for teachers involved in distance education should be extended beyond training in the use of the equipment to include (1) pedagogical techniques appropriate for different subject areas and , (2) appropriate configurations for distance learning classrooms, and (3) classroom management techniques. Resources such as the **Distance Education Inservice Kit** developed for Alberta Education have been prepared to assist the inservice education of teachers who will be involved in distance education. Besides supporting workshops for teachers who will be involved in this mode of education, Alberta Education

should request that the Faculties of Education in Alberta Universities begin to address pedagogy in distance education in both their inservice and pre-service programs.

Cost Effectiveness

Since no formal cost effectiveness analysis was performed during Phase 1, the following is offered as a somewhat terse analysis of costs for those who may be interested in adopting CML mathematics. Except where aides were engaged to assist with large CML classes, the incremental costs associated with CML were associated with the capital costs of the MicroVAX system and the CBTS software, and the cost of the student materials. All of these costs have changed since Phase 1. The MicroVAX 2000 series has been replaced by the 3000 series. The cost of the latter as a stand-alone system is quoted as $23,321.30. The CML system leased from CBTS is now available to the schools under a provincial license to Alberta Education. The cost of the Distance Education student materials for a 5-credit course is proposed to increase from $20 per course to $50 per course. Assuming an amortization period of five years for the MicroVAX, the annual cost of the system would be $4,665 plus maintenance costs. The present approach to maintenance appears to be that of acquiring an additional system for clusters of schools, and substituting parts from this system for parts which malfunction in the school systems. The malfunctioning components are then repaired by Digital on a longer turn-around, lower-cost basis. Again amortizing the cost over five years, this arrangement probably adds another $1,000 per year to the cost for each school. Finally, a cluster of schools requires a coordinator whose responsibility it is to install equipment, conduct inservice training, and the like. In 1989-90, this was estimated to cost $75,000 for 26 schools, or approximately $2,900 per school. This brings the average cost per school per year for equipment and coordination to $ 8,565.

The per student costs for the equipment decrease with an increase in the number of students, and for supplies increase with an increase in the number of students. Following are some sample figures expressed as cost per FTE Students, where an FTE student is equal to 35 credits, and 5 credits per course is assumed:

Table 4.1

CML per student costs for different numbers of students.

No. of Students	No. of FTE Students	Cost per FTE Student
25	3.6	$ 2726
50	7.1	1558
75	10.8	1140
100	14.3	949
125	17.9	827

The cost column in this table was derived by multiplying the number of students by the cost of one 5-credit course ($50), adding the amortized capital costs plus maintenance and coordination costs, then dividing by the number of FTE students. (No provision was made for additional support staff such as a teacher aide.)

These cost estimates do include the capital cost of equipment acquisition. School districts may choose not to include equipment costs in calculating the incremental cost of using CML. In that case the per FTE student costs would be considerably lower. However, school districts should be mindful of the fact that data processing equipment has a relatively short life expectancy. They must be prepared to upgrade or replace the system when it no longer meets the demands required of it.

Cost data were not gathered for the courses in which audioconferencing took place. There do not, however, appear to have been any additional staff costs associated with audioconferencing. At this point, more needs to be done to make the audioconferencing work well before it is appropriate to conduct a cost analysis. Schools did note that long distance charges associated with audioconferencing between some schools was considered a significant disadvantage if the school had to pay the charges.

APPENDIX A

INTERVIEW PROTOCOLS

PRINCIPAL INTERVIEW PROTOCOL — DLPN

1. What elements of DL are in your school? CML, TC, ACS

2. From the school's perspective what, if any, has been the impact on . . .

   2.1. . . . student program
   2.2. . . . staff
   2.3. . . . facilities
   2.4. . . . time-tabling
   2.5. . . . resources not funded by Alberta Education (e.g., libraries)
   2.6. . . . relationships to other schools and districts
   2.7. . . . school finances
   2.8. . . . other?

3.1 What assistance from the District did you receive in implementing the program?

3.2 What additional assistance do you think you ought to have received?

4. Satisfaction:
   4.1. What level of satisfaction do you perceive your staff to have with the Distance Learning project?
      4.1.1. What about those not participating directly?

   4.2. How have the parents of your students reacted to the project?
      4.2.1 How have parents been informed about the project?

   4.3. What community reaction has there been apart from parents of the students involved?
      4.3.1. What indicators have you had?

   4.4. About yourself, how satisfied have you been with the project to date?
      4.4.1. Has the staffing within your school worked the way you hoped it would?
      4.4.2. Can you comment on the relationship between your school and the Off-site teachers?
      4.4.3. How has the project been coordinated in your school?

5. **Expectations:**

   5.1. What benefits did your school expect from participating in the Distance Learning project?

   5.2. What benefits do you feel your school obtained?

   5.3. What was expected of your school to participate in the program?
      5.3.1. Was your school able to meet those expectations?

   5.4. What was expected of you personally?
      5.4.1. Were you able to meet those expectations?

6. Tell me how you went about **allocating resources** (e.g., staff) to the Distance Learning project and why.

7. Let's talk about scheduling for audioconferencing or live ACCESS broadcasts...

8. Has **communication with the project leadership** been adequate for you to operate the program satisfactorily?
   8.1. Do you have suggestions for changing the nature of communication?

9. **Strengths & Weaknesses:**
   9.1. What would you identify to be the strengths of the project in its present form?
   9.2. What would you identify to be the weaknesses?

10. What would you suggest as the best way to organize and manage the distance learning project across the participating schools?

11. Generally, do you have **suggestions** for changes you would like to see in the program?

TEACHER INTERVIEW PROTOCOL

1. Expectations

1.1 What courses have you been involved with in DL?

1.2. Tell me generally what your role has been in the distance learning courses?

1.3. Now let's review the details of what you have actually been doing.

[1] Tending fax
[2] Record keeping
[3] Tending phone
[4] Tutoring/teaching DLSS subjects
[5] Administration
[6] Maintenance of hardware
[7] EMail
[8] Computer Conferencing
[9] Computer Managed Learning
[ ] Other

1.4 Did what you originally expected to do differ from what you have actually done? [ ] Yes [ ] No

IF YES, in what ways?

1.5 How were you prepared to work with distance learning?

1.6. Have problems arisen in implementing the project that you didn't expect? If yes, specify.

2. Time

2.1. What have been the demands on your time as a result of DL?
2.2 If additional time, when is it spent?

3. Changes in Role

3.1. Have there been changes in your role as new technologies were introduced?

3.1.1.	EMail	yes [ ]	no [ ]
3.1.2	Computer Conferencing	yes [ ]	no [ ]
3.1.3	ACCESS Broadcasts	yes [ ]	no [ ]
3.1.4	Computer Managed Learning	yes [ ]	no [ ]

3.2. If there have been changes, what is the nature of the change?

4. Colleagues

4.1. How functional has been the relationship between you and the **off-site teachers**?

4.1.1. Tell me about some of the things in your relationship with the off-site teachers that you were pleased with.

4.1.2. Tell me some of the things that you perceived as dysfunctional—didn't work well.

5. Tutoring

5.1. How much tutoring took place locally?

5.1.1. Who is doing the tutoring? [ ] coordinator [ ] aide
[ ] other teachers [ ] other students?

5.1.2. IF BY OTHER TEACHERS, was it [ ] casual [ ] frequent?

5.1.3. IF BY OTHER TEACHERS, was it [ ] formal [ ] informal?

5.1.4 IF BY OTHER STUDENTS, was it [ ] casual [ ] frequent?

5.1.5 IF BY OTHER STUDENTS, was it [ ] formal [ ] informal?

5.2. How frequently were the tutor/markers called upon for tutoring assistance?

6. ACS Materials

6.1. What do you see as the strengths of the ACS Materials?

6.1.1 Old ACS Materials
6.1.1.1 Please give examples

6.1.2 New ACS Materials
6.1.2.1 Please give examples

6.2. What do you see as the weakness of the ACS Materials?

6.2.1. Old ACS Materials
6.2.1.1 Please give examples

6.2.2 New ACS Materials
6.2.2.1 Please give examples

7. Learning/teaching issues

7.1 What has been the impact on student learning, and has it been differential?

7.2 How has student progress been tracked and managed?

8. **Supporting resources** (Note courses referenced)

8.1. How have your physical facilities helped or hindered distance education?

8.2 Are there material resources which you found necessary but lacking?
7.2.1 IF YES, please give examples.

8.3 Did you use human resources other than those formally available through the program (e.g., persons in the community)?

8.4 Were there human resources for distance learning which you would have liked but which were unavailable to you?
7.4.1 IF YES, please give examples.

9. **Suggestions**

9.1. What resources do you feel need to be added to improve the program?

9.2. What suggestions would you have for improving the coordinator role?

9.3. What other changes would you suggest?

STUDENT INTERVIEW PROTOCOL

1. First, tell me which courses you have been taking through Distance Learning this year.

2. Have you ever taken correspondence school courses before? [ ] Yes [ ] No

   2.1. IF YES...
   2.1.1. When?
   2.1.2. What courses?

   2.1.3. What did you find different between those courses and the ones you are taking through Distance Learning?

3. **When did you do most of your work** for your DL courses?
   [ ] Regularly scheduled periods [ ] Spares [ ] Outside school hours

4. **Where did you do most of your work** for your DL courses?
   [ ] At Home [ ] DL Room [ ] Library [ ] Regular classroom

5. Is where you study and when you study for the DL courses the same pattern as for your "regular" courses?
   [ ] Yes [ ] No

6. How do your **grades** compare between DL Courses and courses locally available in your school?

   CML [ ] DL better [ ] DL the same [ ] DL poorer

   ACS [ ] DL better [ ] DL the same [ ] DL poorer

   TC [ ] DL better [ ] DL the same [ ] DL poorer

7. When you were studying and needed **help**. . .how did you get it?
   [ ] Didn't get help [ ] Aide [ ] ACS Marker [ ] Subject Teacher
   [ ] Other Teachers [ ] Other Students [ ] Parents [ ] Other

8. Which of the following **resources** did you use, if any?

		Perceived Usefulness		
		Very	Somewhat	Not
[ ]	library books	[ ]	[ ]	[ ]
[ ]	films	[ ]	[ ]	[ ]
[ ]	videotapes/cassettes	[ ]	[ ]	[ ]
[ ]	filmstrips	[ ]	[ ]	[ ]
[ ]	audiotapes/cassettes	[ ]	[ ]	[ ]
[ ]	kits	[ ]	[ ]	[ ]
[ ]	teachers in your school	[ ]	[ ]	[ ]
[ ]	Tutor/Markers	[ ]	[ ]	[ ]

9. Let's talk about the different **components** of Distance Learning?

9.1. OLD Correspondence Course Materials

9.1.1. Was the reading level [ ] too easy, [ ] about right, [ ] too difficult?

9.1.2. Was the way the material was organized [ ] easy to use or [ ] difficult to use?

9.1.2.1. Why?

9.2. NEW Correspondence Course Materials

9.2.1. Was the reading level [ ] too easy, [ ] about right, [ ] too difficult?

9.2.2. Was the way the material was organized [ ] easy to use or [ ] difficult to use?

9.1.2.1. Why?

9.3. FAX

9.3.1. Was the turnaround time getting feedback to you fast enough?
[ ] Yes [ ] No

9.3.2. Was the feedback you received useful to you?
[ ] Yes [ ] No

9.3.2.1. Did you normally read the feedback you received?

9.3.3. How was the quality of print on the faxed materials?

9.4 Computer

9.4.1 Did you send/received messages from the Tutor/Marker using **electronic mail**? [ ] Yes [ ] No

9.4.1.1 How useful did you find electronic mail?

9.4.2 Did you use the **electronic bulletin board**?
[ ] Yes [ ] No

9.4.2.1 How useful did you find the electronic bulletin board?

9.5. Audioconferencing

9.5.1. Did you participate in audioconferencing sessions?
[ ] Yes [ ] No

9.5.1.1. IF YES. . .

9.5.1.1.1. Which courses?

9.5.1.1.2. Did you feel comfortable talking?
IF NOT, why not?

9.5.1.1.3. Could you easily understand what was being said?
[ ] Yes [ ] No

9.6. Computer Managed Learning

9.6.1. Did you use a computer managed learning system?
[ ] Yes [ ] No

IF YES...

9.6.2. Which course(s) did you use it in?

9.6.3. Tell me what, if anything, you liked about it.

9.6.4. Tell me what, if anything, you disliked about it.

9.6.5 Did you find the computer easy to use? [ ] YES [ ] NO

9.6.6 What was the role of your teacher in the CML course(s)?

9.7. Off-site teachers (ACS or another school)

9.7.1. Did you get useful feedback on your assignments?
[ ] Yes [ ] No [ ] Sometimes

9.7.1.1. Give me some examples that you can think of.

9.7.2. Did you ever contact a tutor at ACS or in another school directly looking for assistance? [ ] Yes [ ] No

9.7.2.1. IF YES...which of the following did you use?
[ ] phone
[ ] FAX
[ ] electronic mail
[ ] electronic bulletin board

9.7.2.2. IF YES...did you get the help you needed?
[ ] Yes [ ] No

9.7.2.3. IF YES...were you looking for help with course material or for advice on other matters, for example, what course to take next?

~~10. What would you be doing with your time if Distance Learning weren't available?~~

11. Did you find it difficult to get assignments done on time? [ ] Yes [ ] No
12.1. IF YES...why?

12. For courses where there wasn't a local teacher available, does it matter to you that there wasn't a local teacher for the DL courses you took?

13. Did you find that you needed materials that weren't available locally?
[ ] Yes [ ] No

13.1. IF YES...what kinds of material?

13.2. Were you able to get them? [ ] Yes [ ] No

13.2.1. IF YES...how and with whose help?

14. What did your school do to prepare you to take courses through Distance Learning?

15. If you could make changes in the program, what changes would you like to see?

16. Given your experience thus far and choice in the matter, would you continue to take courses this way?

17. Would you recommend to other students that they take courses this way?

That's the end of my list. Have you got any questions for me?

Thanks very much for helping. Good luck.

QUESTIONS ADDED TO STUDENT PROTOCOL:

1. Did you use the computer to get your own tests?
2. Did you have any difficulty using the computer?
3. Was the level of difficulty of the tests: OK? too easy? too difficult?
4. Did you complete the booklet before you took the test?
5. What did you do if you did not get 80% on your first try?

   Drew second test?
   Reviewed booklet?
   Did booklet again?
   Reviewed test?
   Sought help—teacher? peer?